

Bull Creek Watershed Lakes



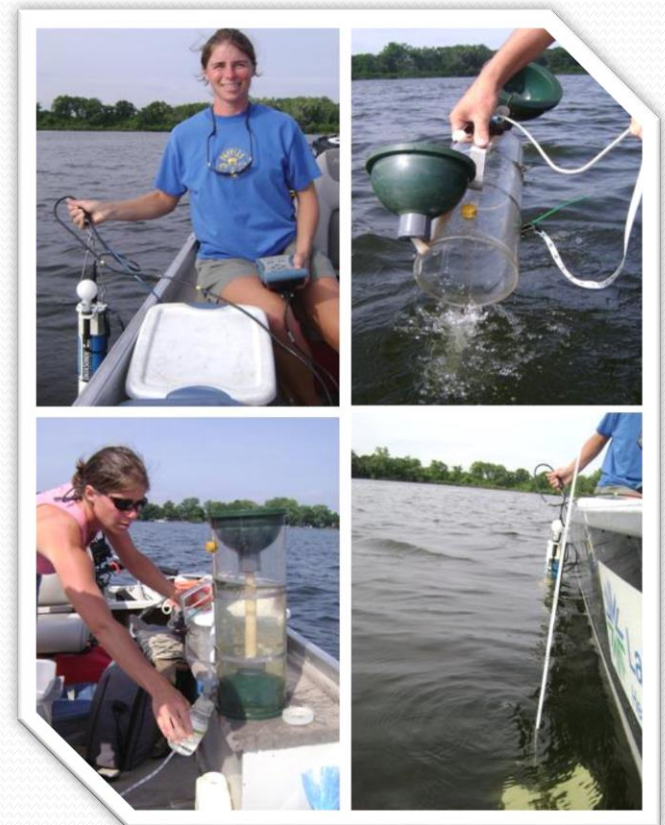
Gerard Urbanozo
Water Quality Specialist
Ecological Services

2015 Summary Report

Loch Lomond - St. Mary's Lake

Butler Lake - Lake Minear

- May – September
- Water Quality
 - Water Clarity
 - Dissolved Oxygen
 - Nutrients
 - Suspended Solids
- Aquatic Plants
- Shoreline Erosion
- Re-assess IEPA Impairments



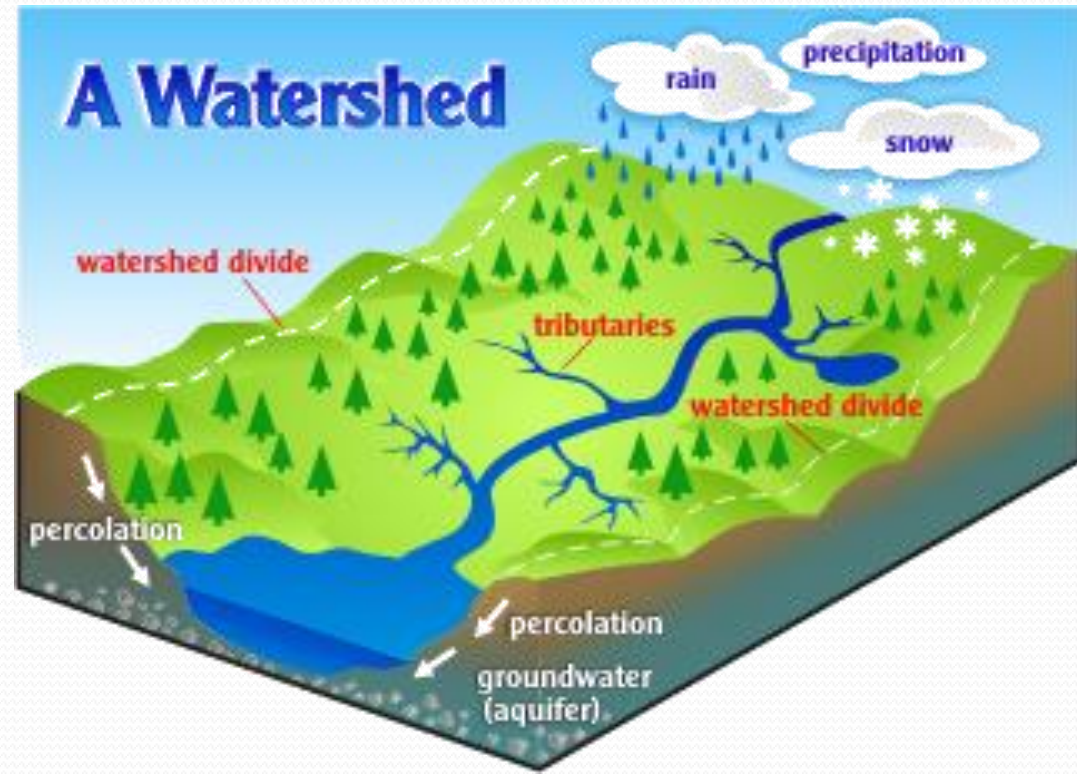
Overview of the Health of Loch Lomond, St. Mary's Lake, Butler and Minear 2004 - 2015

- Combination of data from Lake County Health Department, Illinois Environmental Protection Agency, and the Volunteer Lake Monitoring Program
- Additional Lake Reports from the LCHD
 - 1999, 2004, 2015



What is a Watershed

- A WATERSHED is an area of land where surface water from rain and melting snow meet at a point, such as a lake or stream.



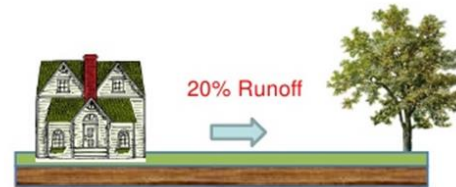
Watershed - Runoff

The Impact of Impervious Land Cover*

Natural Ground Cover



10-20% Impervious Surface



35-50% Impervious Surface



75-100% Impervious Surface



*roads, parking lots, sidewalks, roof tops, patios, etc.

Loch Lomond

LAKE FACTS

Nearest Municipality:

Mundelein

T44N, R10E, Section 24

Major Watershed:

Des Plaines River

Sub-Watershed:

Bull Creek

Surface Area:

74.85 acres

Shoreline Length:

2.18 miles

Maximum Depth:

8.0 feet

Average Depth:

5.0 feet

Lake Volume:

376.08 acre-feet

Watershed Area:

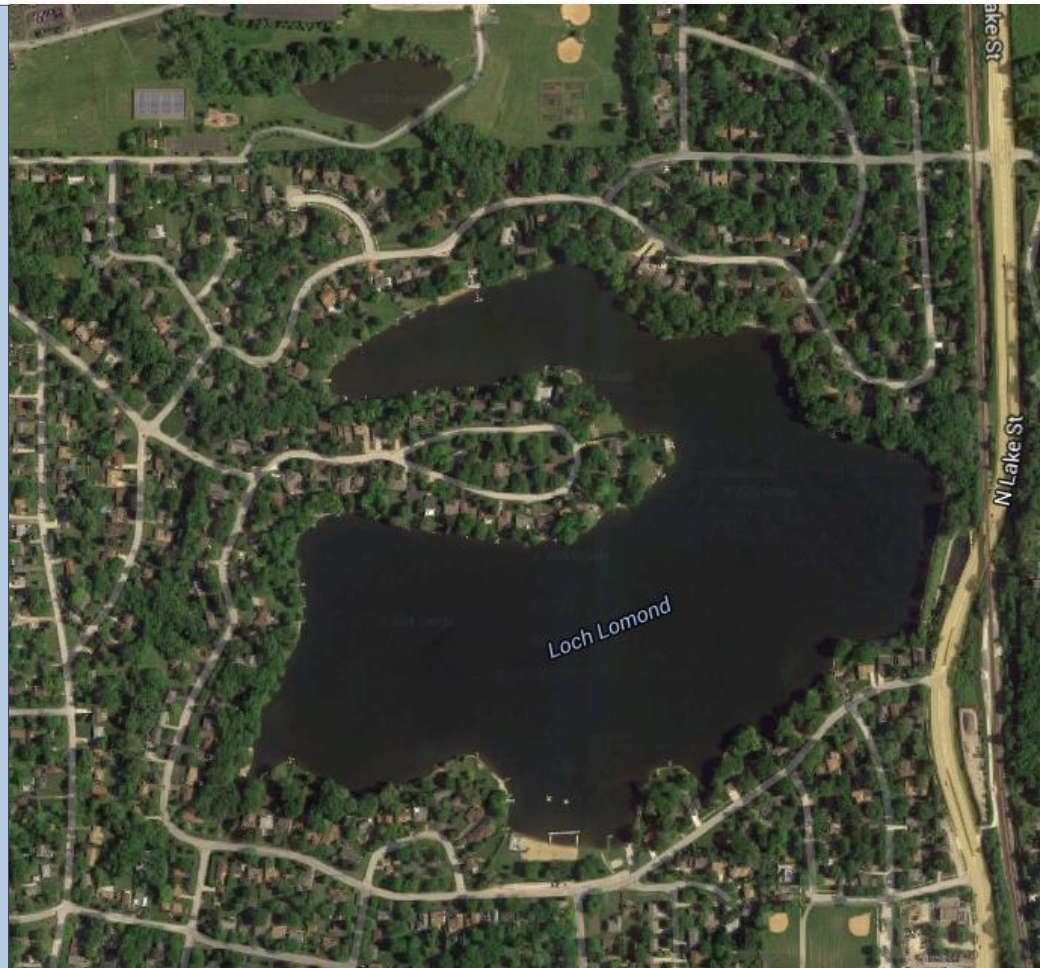
1439.10 acres

Lake Type:

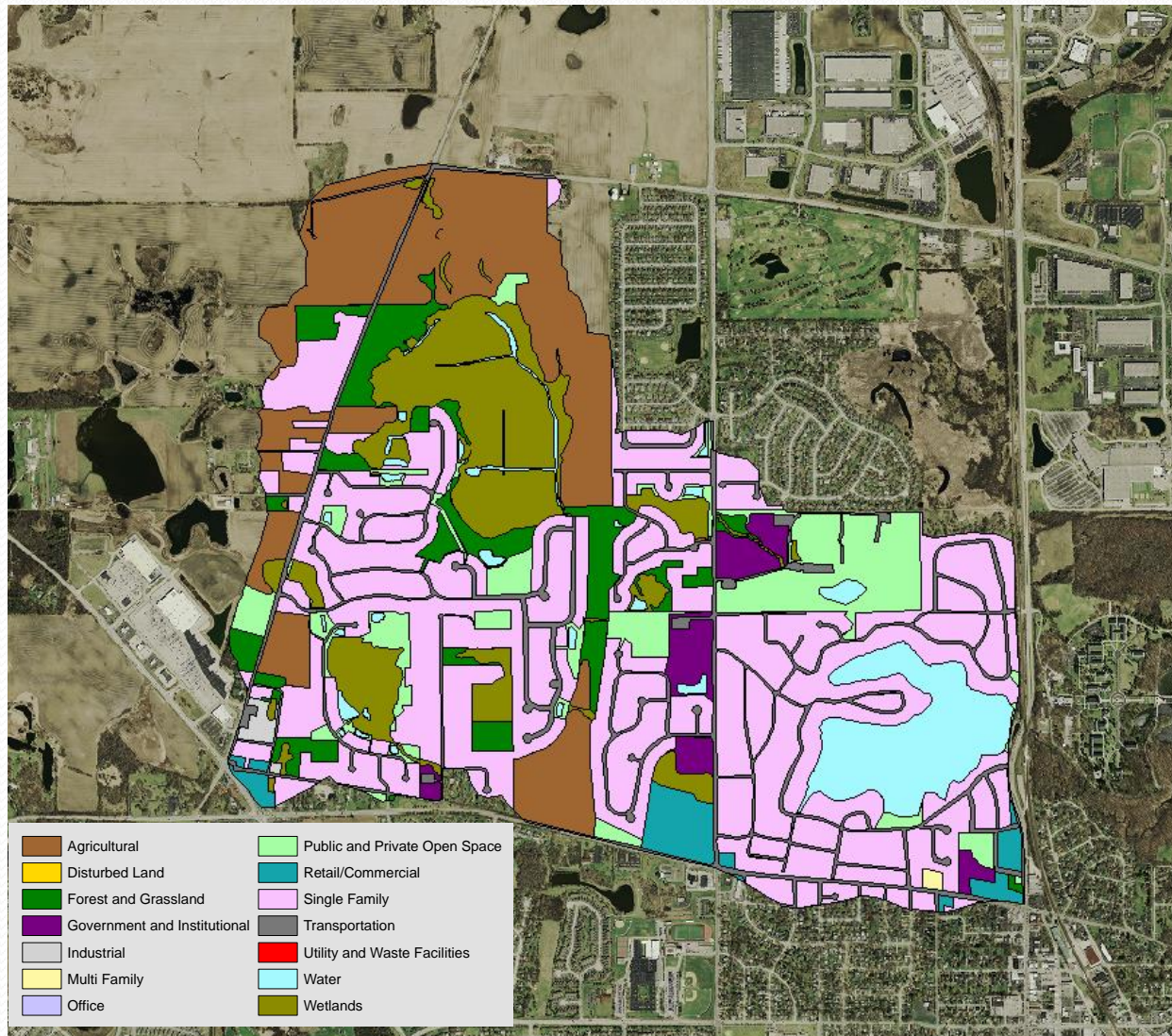
Impoundment

Current Uses:

Fishing, non-motorize
boating, swimming and
aesthetics



Loch Lomond Watershed



St. Mary's Lake

LAKE FACTS

Municipality:

Mundelein and Libertyville
T44N, R10E, Section 24

Major Watershed:

Des Plaines River

Sub-Watershed:

Bull Creek

Surface Area:

104.57 acres

Shoreline Length:

3.55 miles

Maximum Depth:

14.0 feet

Average Depth:

8.23 feet

Lake Volume:

951 acre-feet

Watershed Area:

2944.65 acres

Lake Type:

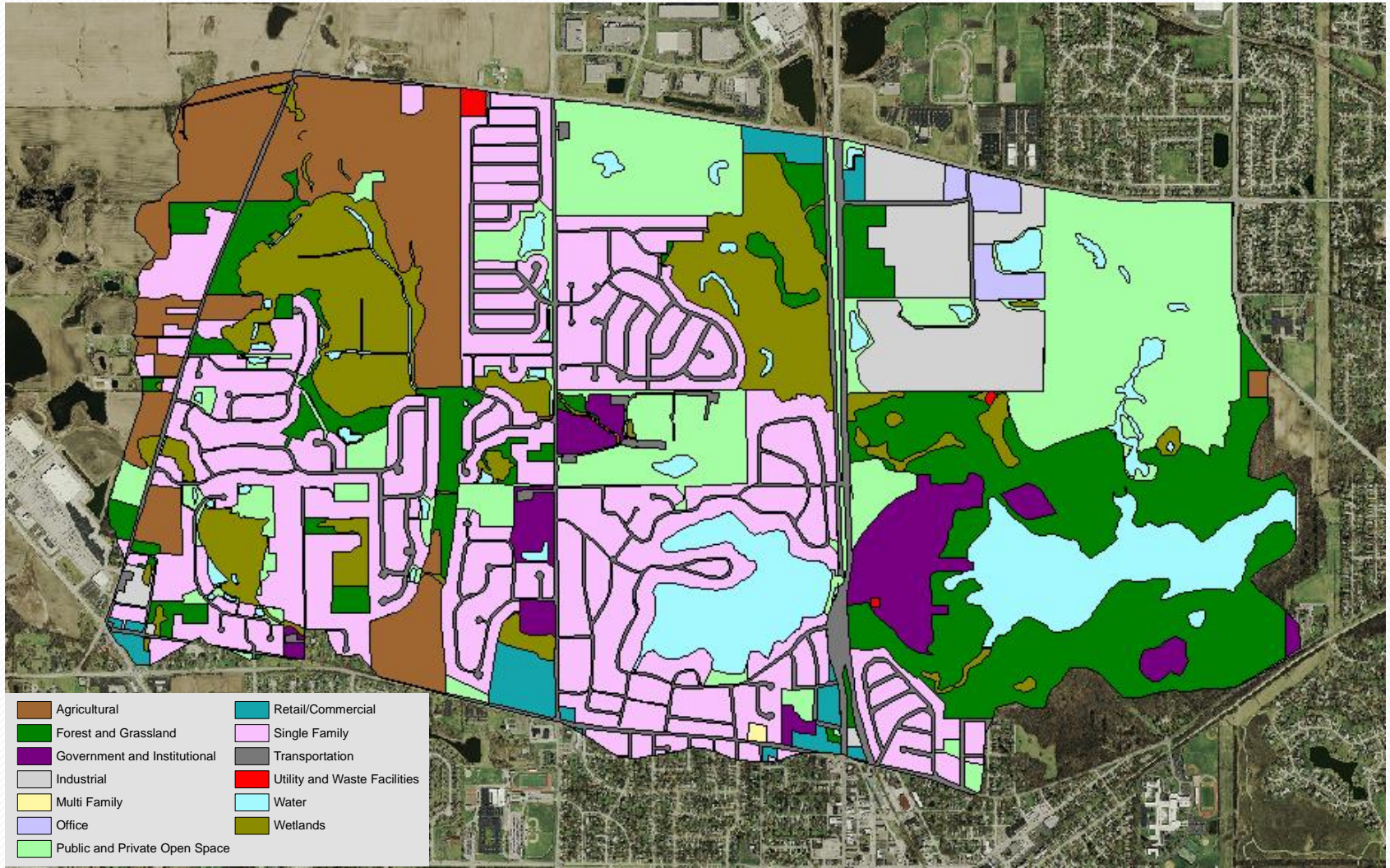
Impoundment

Current Uses:

Fishing, non-motorize
boating, and aesthetics



St. Mary's Lake Watershed



Butler Lake

LAKE FACTS

Township:

Libertyville Township
T44N, R11E, Section 16, 17

Major Watershed:

Des Plaines River

Sub-Watershed:

Bull Creek

Surface Area:

55.19 acres

Shoreline Length:

2.48 miles

Maximum Depth:

9 feet

Average Depth:

4.1 feet

Lake Volume:

230.38 acre-feet

Watershed Area:

3919.36 acres

Lake Type:

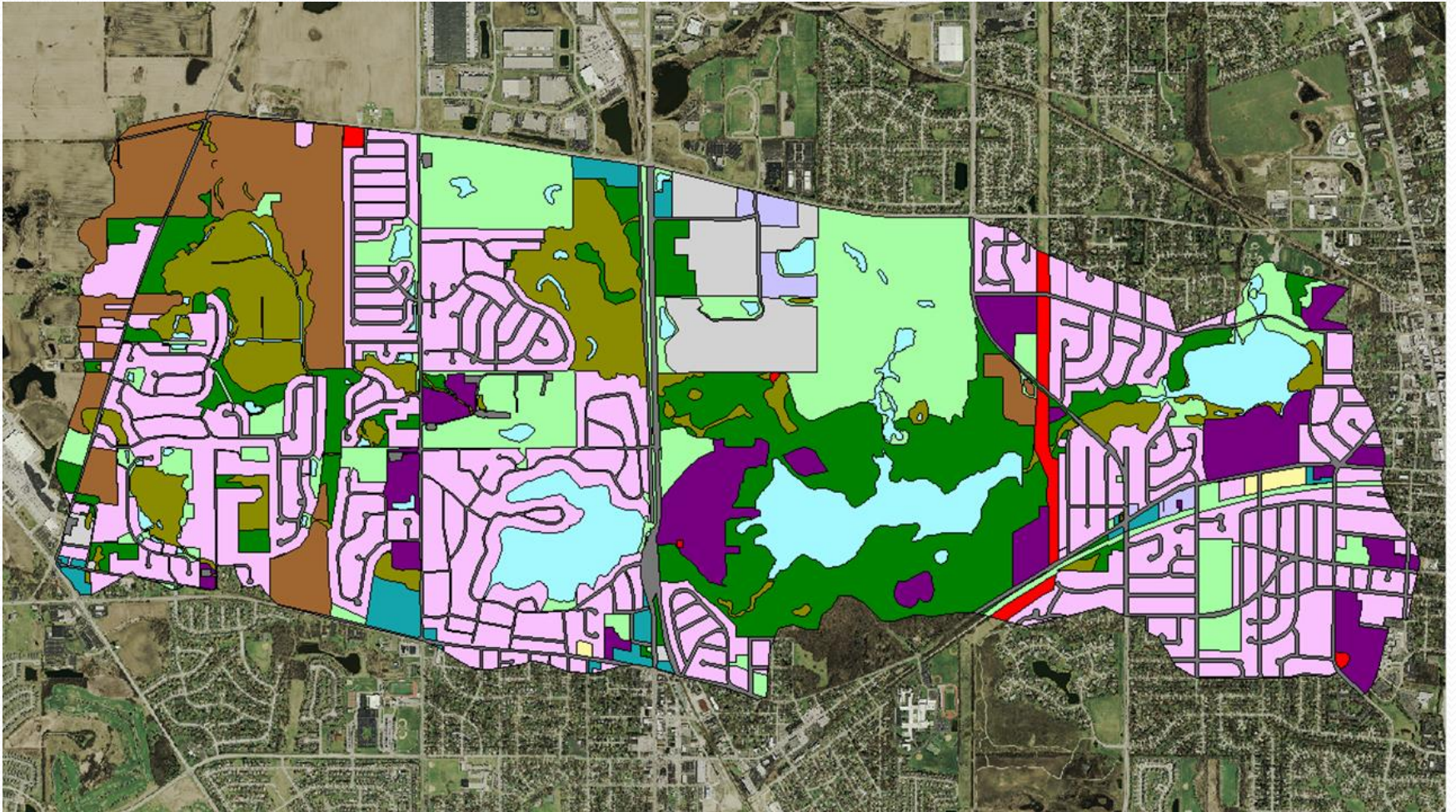
Glacial / Impoundment

Current Uses:

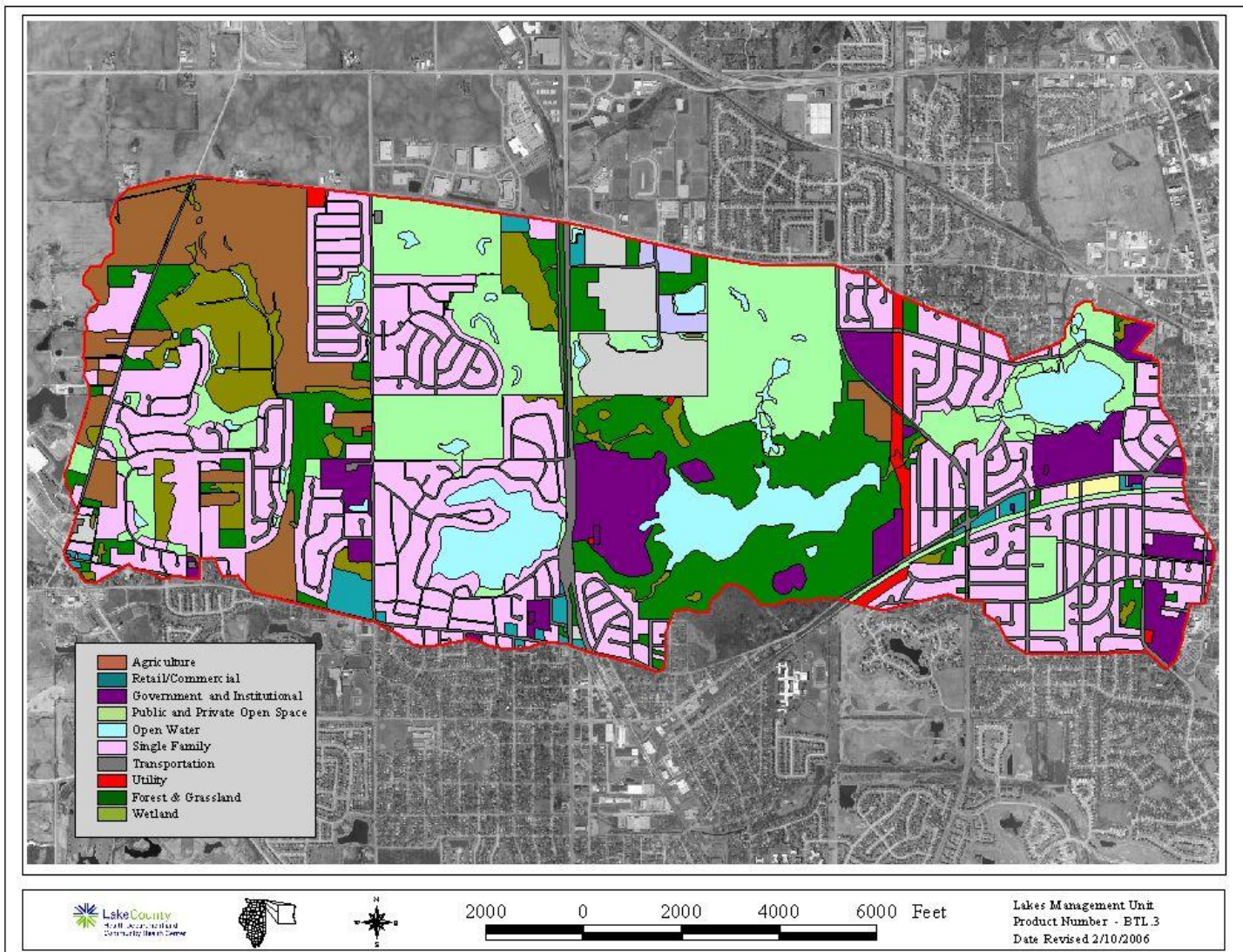
Fishing, non-motorize
boating, and aesthetics



Butler Lake 2015 Watershed



Butler Lake 2005 Watershed



Lake Minear

LAKE FACTS

Municipality:

Libertyville

T44N, R11E, Section 15,
17

Major Watershed:

Des Plaines River

Sub-Watershed:

Upper Des Plaines

Surface Area:

77.8 Acres

Shoreline Length:

3.5 miles

Maximum Depth:

20 feet

Average Depth:

11.9 feet

Lake Volume:

756.37 acre-feet

Watershed Area:

239 acres

Lake Type:

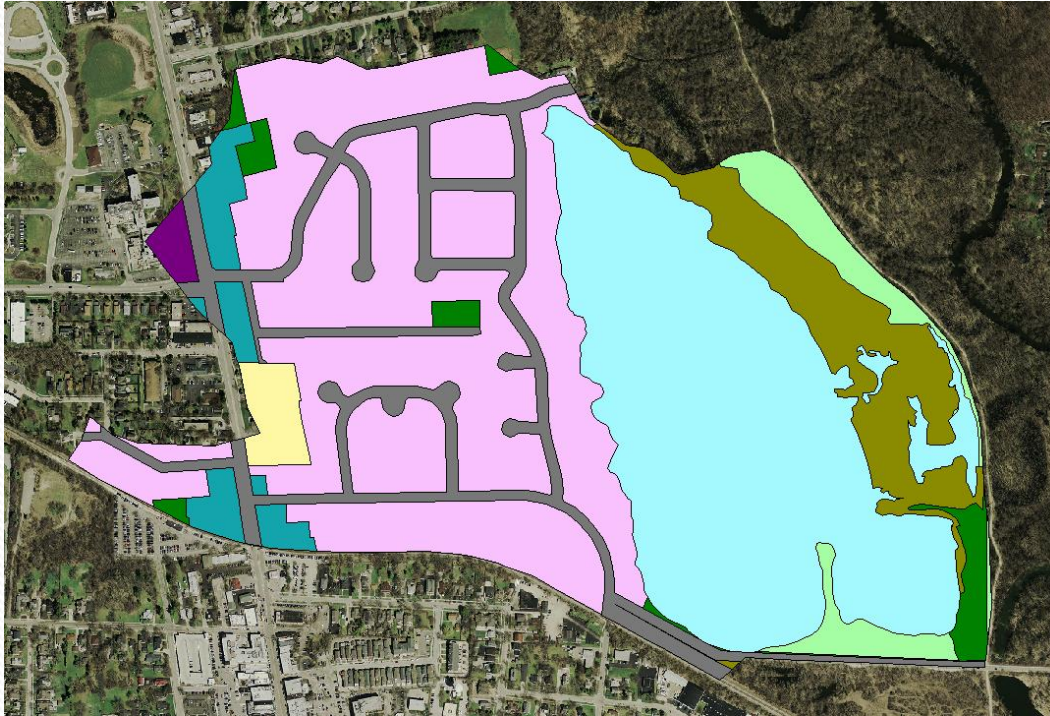
Borrow Pit

Current Uses:

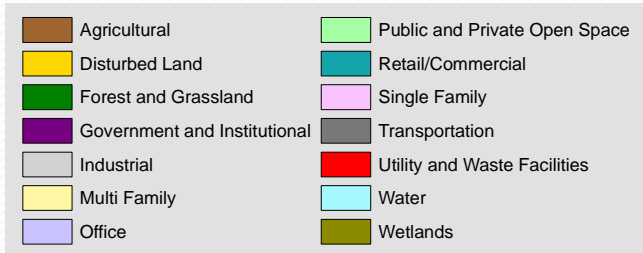
Fishing, non-motorize
boating, swimming, and
aesthetics



Lake Minear Watershed

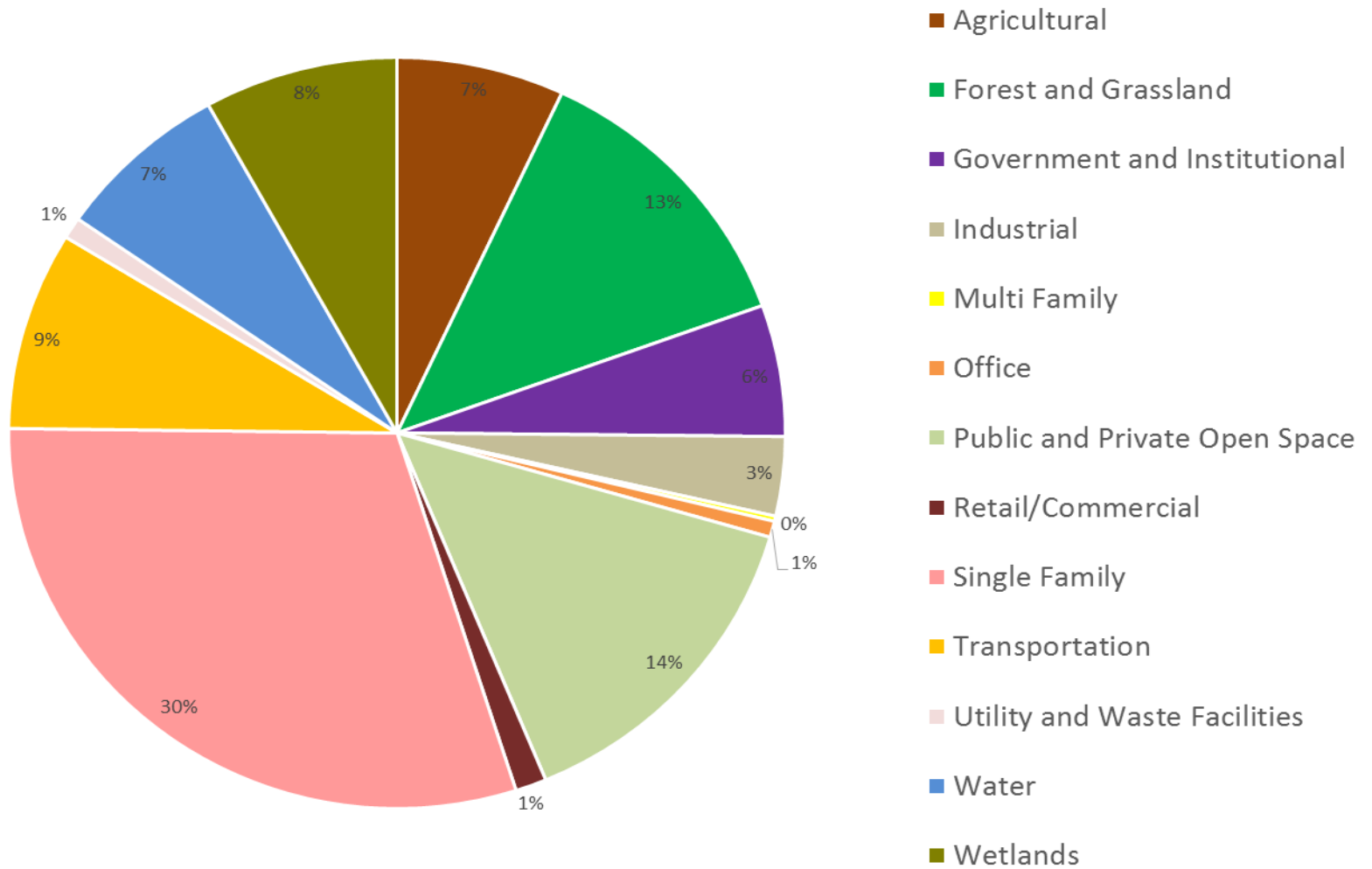


Area: 238.9 Acres
 Lake Volume: 756 acre-feet
 Retention time: 4.6 years



Land Use	Acreage	Runoff Coeff.	Estimated Runoff, acft.	% Total of Estimated Runoff
Forest and Grassland	6.09	0.05	0.8	0.5
Government and Institutional	1.54	0.50	2.1	1.3
Multi Family	3.65	0.50	5.0	3.1
Public and Private Open Space	9.55	0.15	3.9	2.4
Retail/Commercial	7.93	0.85	18.5	11.3
Single Family	89.02	0.30	73.4	44.6
Transportation	24.78	0.85	57.9	35.2
Water	76.37	0.00	0.0	0.0
Wetlands	19.98	0.05	2.7	1.7
TOTAL	238.93		164.6	100.0

Land Use for Loch Lomond, St. Mary's Lake and Butler Lake



What Impacts Water Clarity

- Nutrients
 - Phosphorus
 - Nitrogen
- Total Suspended Solids (TSS)
 - Sediments
 - Plankton/Algae
- Precipitation
- Presence or absence of aquatic vegetation
- Boat propellers

Water Clarity

- Algae, Water Color, Eroded Soil, and Resuspended bottom Sediment
- 2015 Lake County Median 2.96 feet
- Aquatic plant density helps with water clarity by competing with algae for nutrients and stabilizing sediments

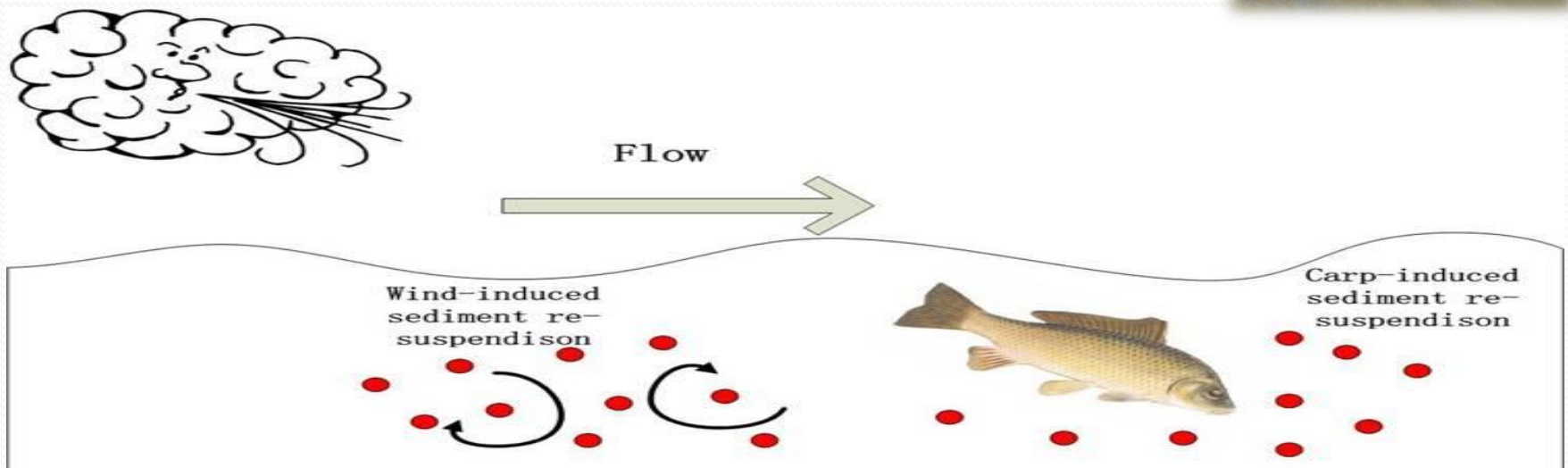


8" disk painted
black and white
lowered until it
disappears



Total Suspended Solids

- The 2015 Lake County TSS median is 8.2 mg/L
- Re-suspended bottom sediment
- Wind/wave activity
- Planktonic Algae
- Sources:
 - Internal: Carp Suspension & Boat traffic
 - External: Watershed/Bank Erosion



Suspended Solids

TSS

Total Suspended Solids

TSS are particles of algae or sediment suspended in the water column.

TVS

Total Volatile Solids

TVS represents the fraction of total solids that are organic in nature, such as algae cells

NVSS

Non-Volatile Suspended Solids

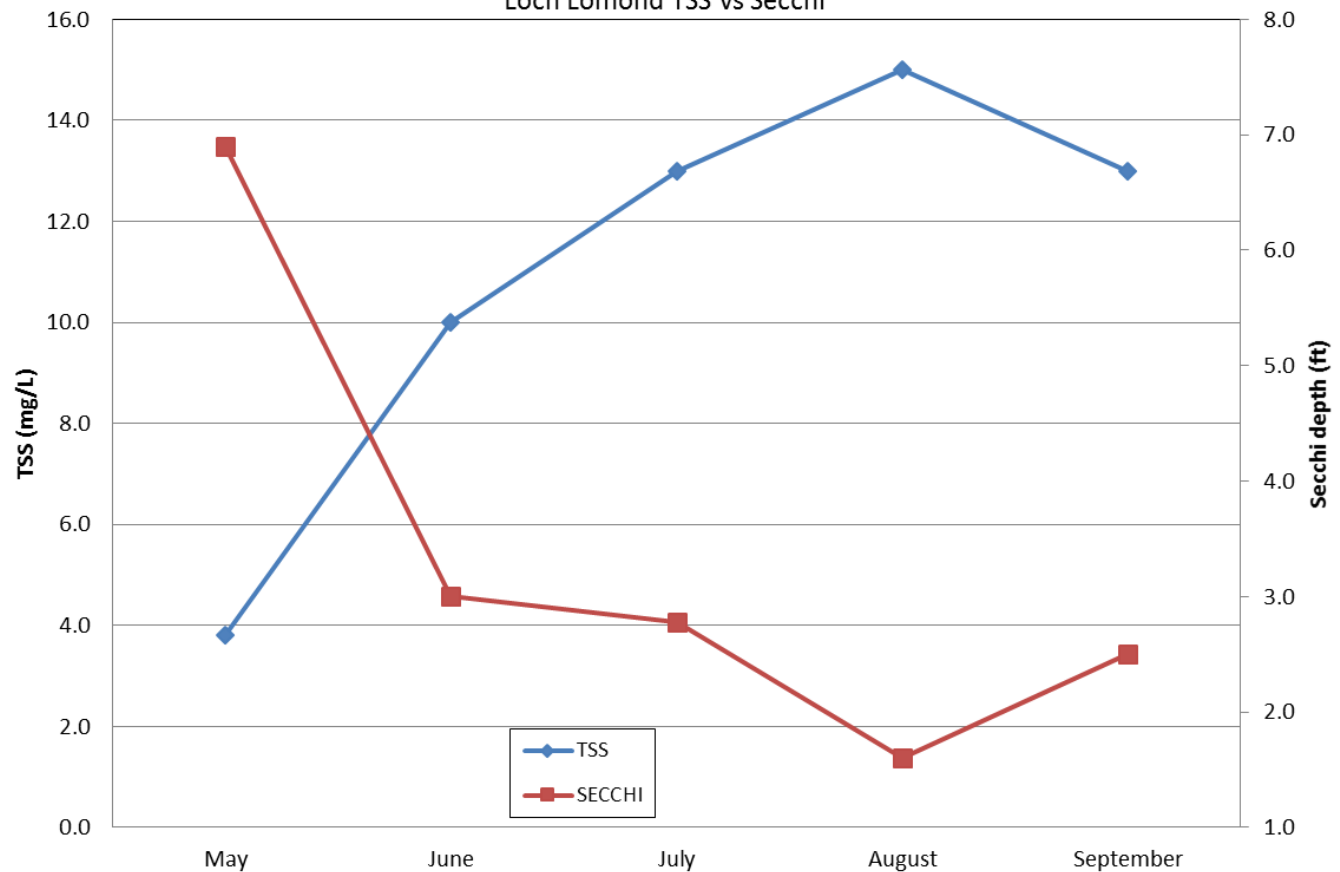
NVSS represents the non-organic clay and sediments that are suspended in the water column.

TDS

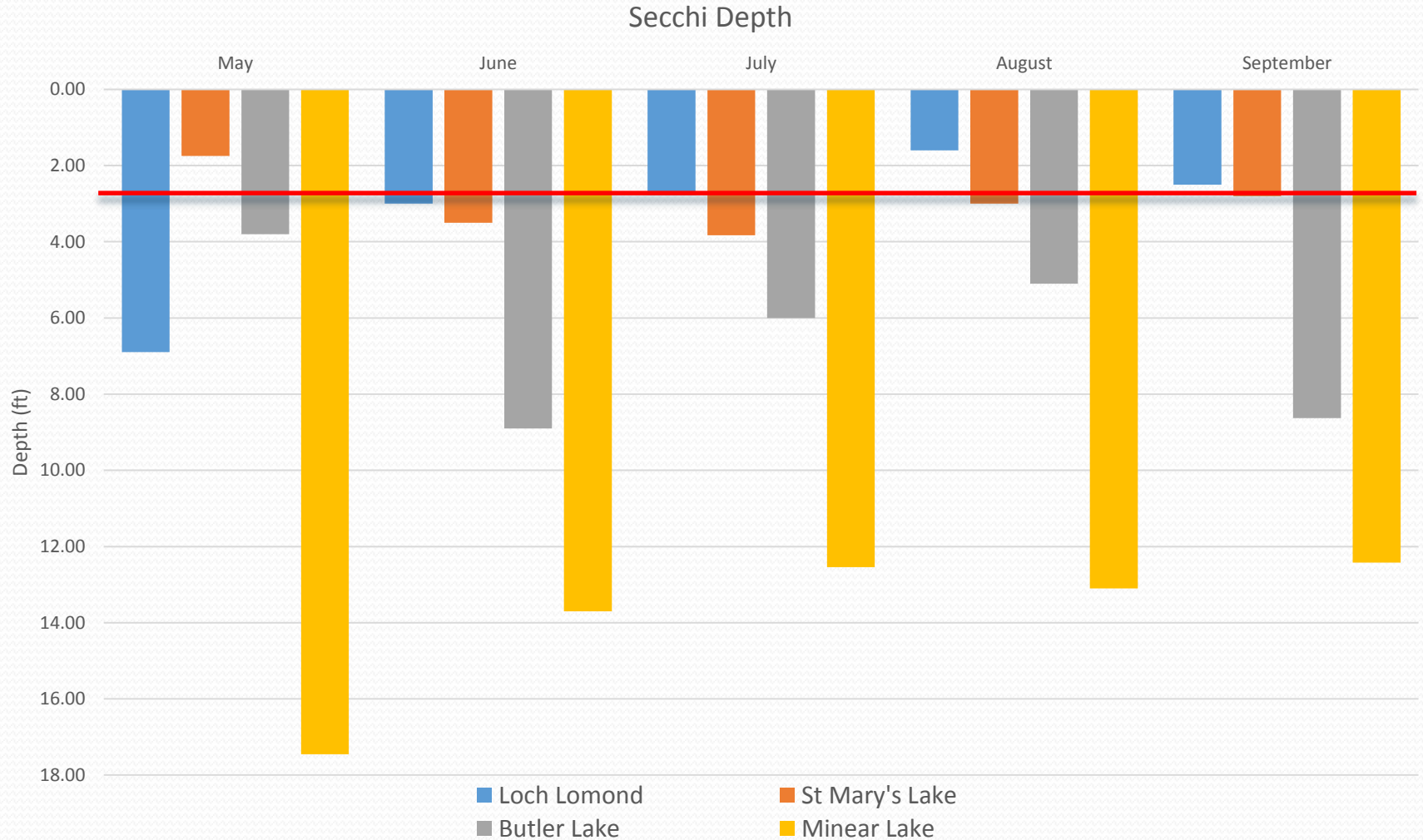
Total Dissolved Solids

TDS are the amount of dissolved substance such as salts or minerals in the water after evaporation.

Loch Lomond TSS vs Secchi



Water Clarity



Watershed Lakes

	Loch Lomond Lake	Loch Lomond Lake	Loch Lomond Lake	Loch Lomond Lake	IMC Lake	IMC Lake	St. Mary's Lake	St. Mary's Lake	St. Mary's Lake	St. Mary's Lake	Butler Lake	Butler Lake	Butler Lake	Butler Lake	Lake Minear	Lake Minear	Lake Minear
Year	1999	2004	2005	2015	2003	2005	1995	2002	2005	2015	1995	2001	2005	2015	2002	2007	2015
Secchi (feet)	1.89	3.27	2.17	2.74	4.96	3.08	2.26	2.68	2.79	2.98	5.83	6.65	4.35	6.49	10.06	7.13	13.84
TSS (mg/L)	19.2	13.2	13.1	10.96	4.4	9.7	12.2	11.8	10.8	8.52	3.1	2.1	6.3	2.3	1.6	3.6	0
TP (mg/L)	0.235	0.245	0.295	0.196	0.039	0.095	0.065	0.075	0.067	0.068	0.031	0.048	0.053	0.032	0.017	0.02	0.016
Conductivity (milliSiemens/cm)	0.7076	0.8232	1.3298	0.7736	1.9958	6.1436	0.5958	1.0272	1.1774	0.998	0.5852	1.0893	1.1602	0.9946	0.657	0.6504	0.661

Direction of Water Flow in the Watershed



Phosphorus

- Limiting Nutrient (Loch Lomond has been Nitrogen Limited)
- Has a direct Effect on how Much Aquatic Plants or Algae can grow



Lawn and
Garden
Fertilizer



Human and
Pet Waste

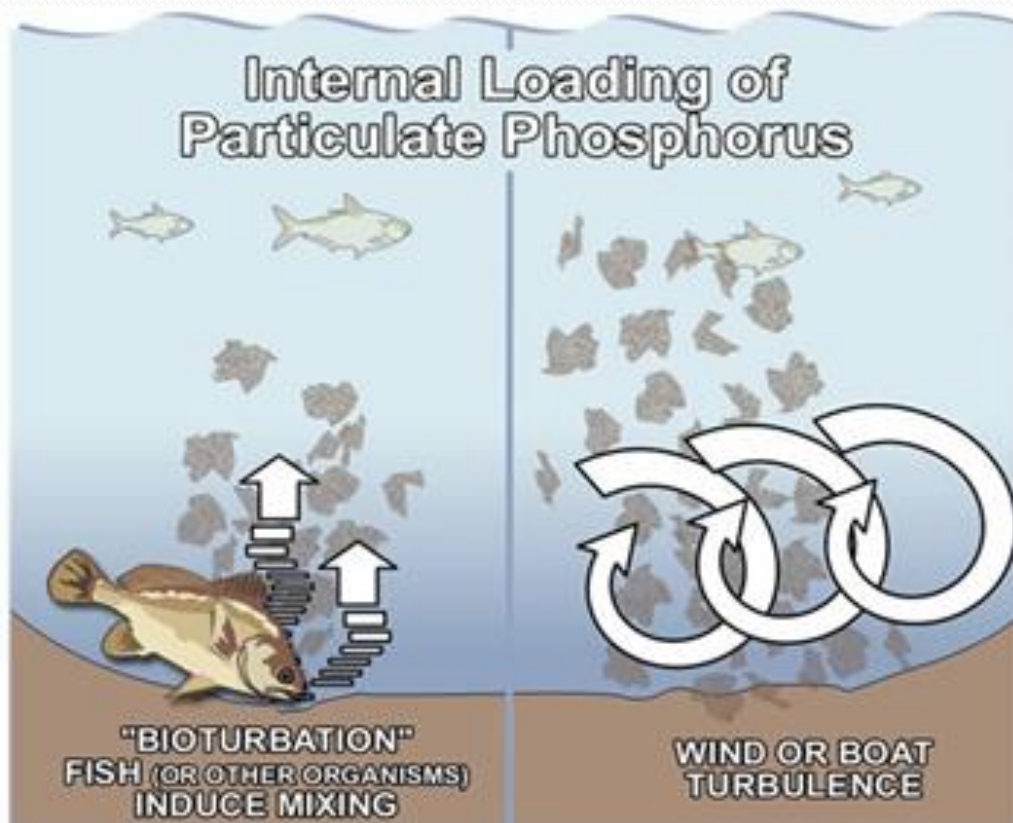


Runoff from
impervious
Surfaces



Shoreline
Erosion and
disturbance

Phosphorus



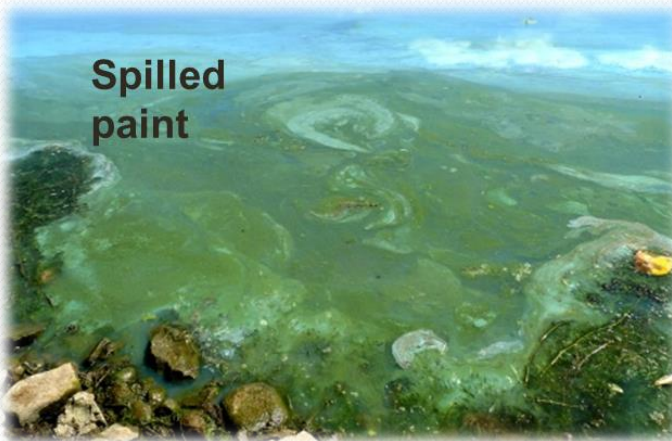
What has been done to reduce Phosphorus Levels

- **September 2015** – Mundelein prohibits the use of fertilizers containing phosphorus.
- **March 2015** – Libertyville bans the use of fertilizer containing phosphorus.
- **July 2010**- The state of Illinois passed a law to reduced the amount of phosphorus content in dishwashing and laundry detergents.
- **July 2010**- The state of Illinois passed a law to restrict the use of phosphorus in fertilizers by commercial applicators.
- **January 2007-2011**- 9 Local municipalities passed an ordinance prohibiting the use of lawn fertilizers containing phosphorus.
- **1972- Clean Water Act**



Algae

BLUE-GREEN ALGAE



FILAMENTOUS ALGAE



DUCKWEED



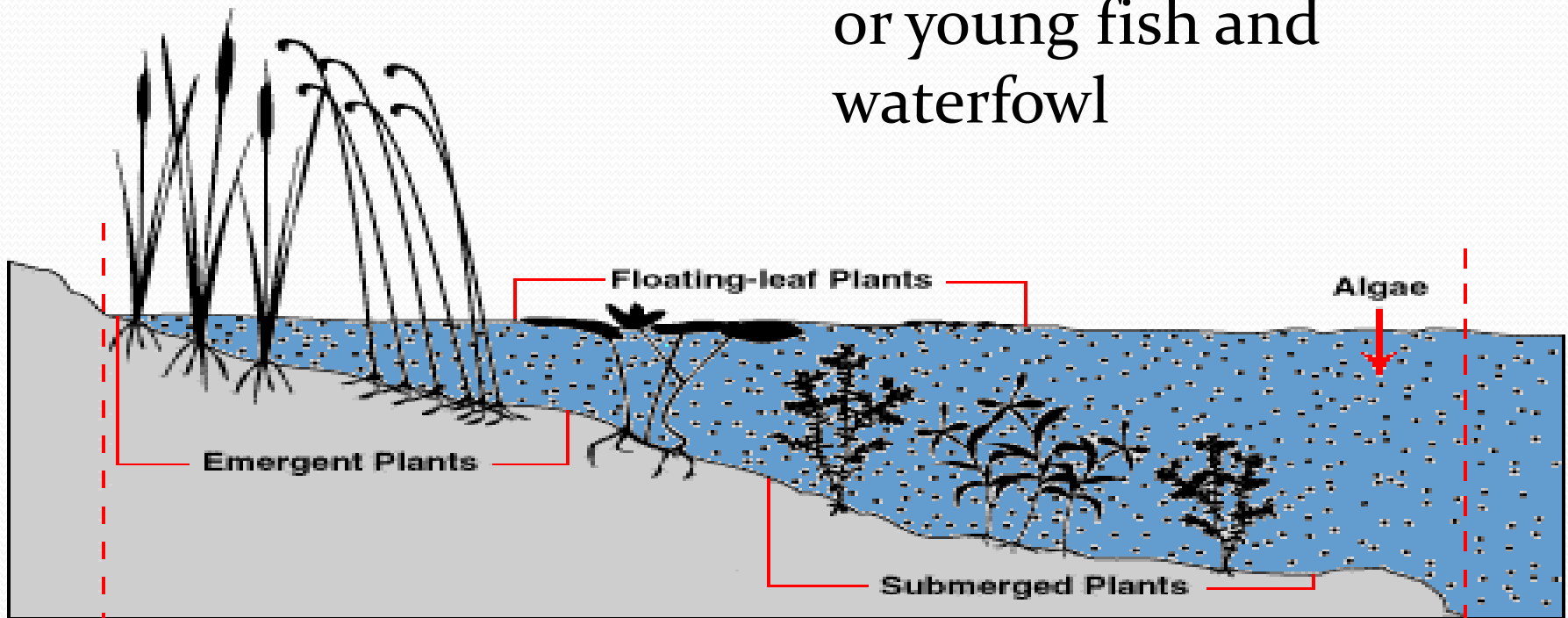
Harmful Algal Blooms



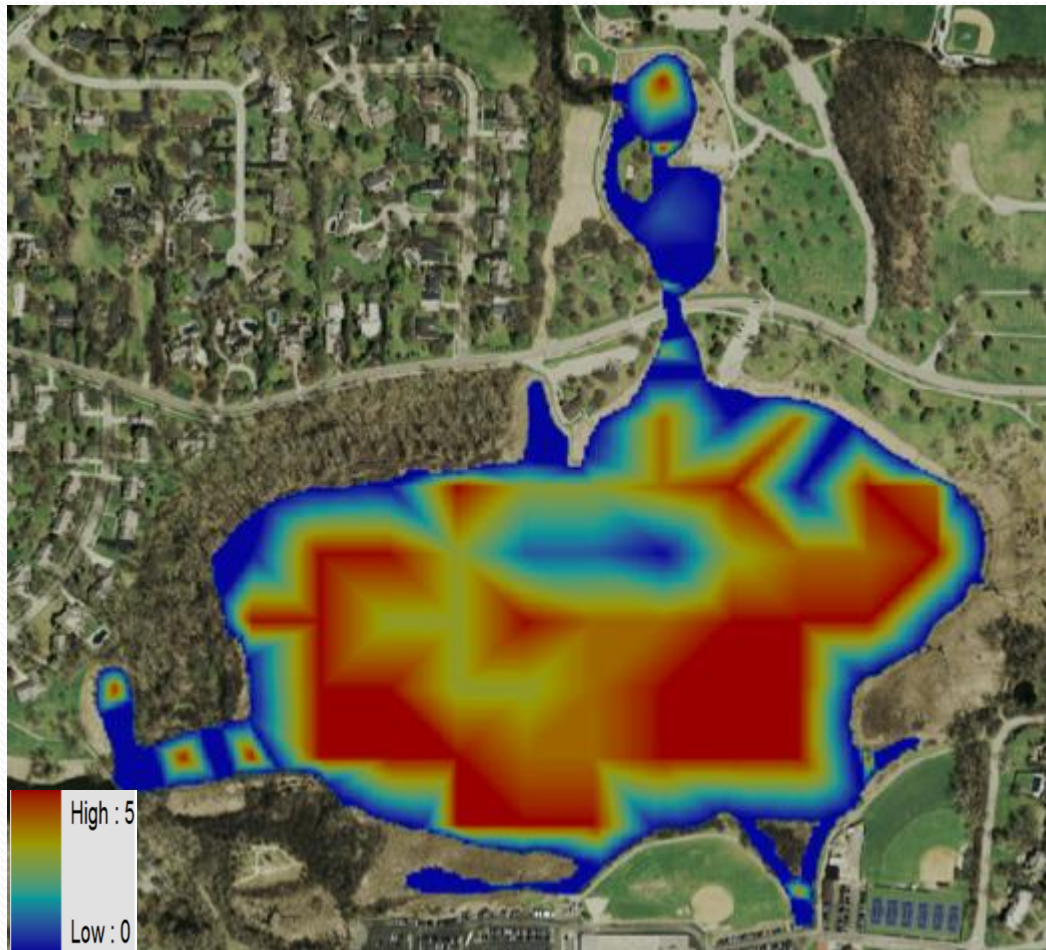
Report blooms to: Lake County Health
Department Environmental Services
(847) 377-8030.

Aquatic Plants

- Compete with Algae for nutrients
- Stabilize suspended solids
 - Increase Water Clarity
- Base of the Food Chain
- The submerged portions of macrophytes provide shelter and cover for small or young fish and waterfowl



Butler Lake 2015 Aquatic Plants

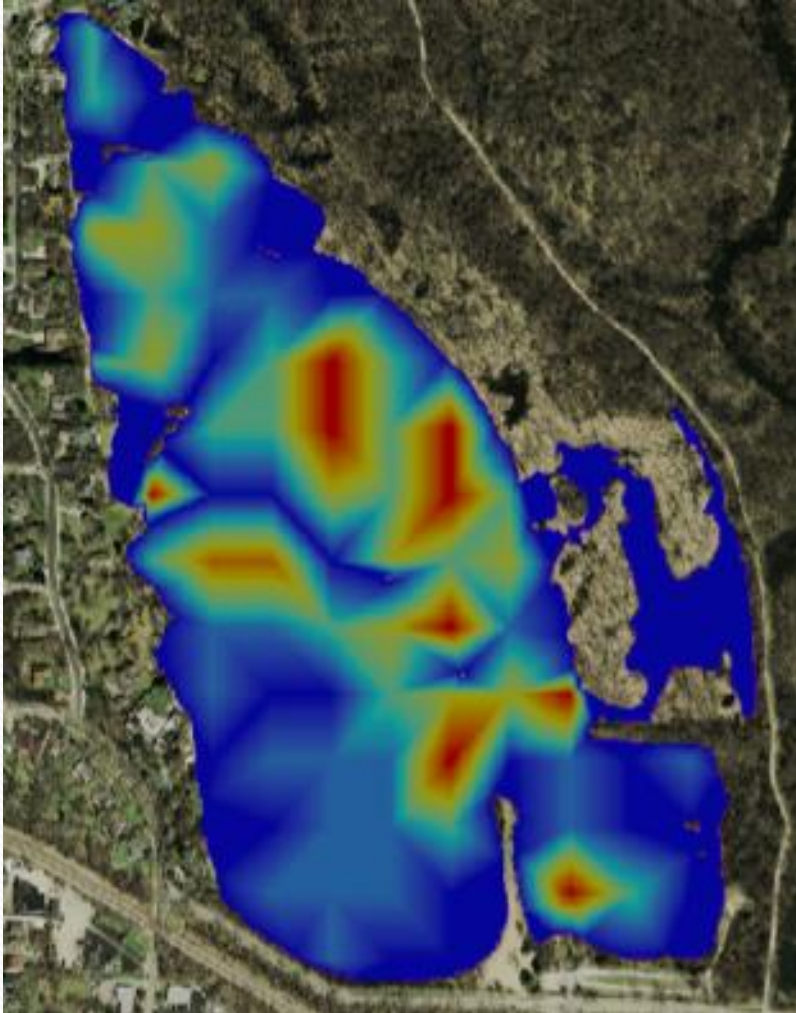


Rake Density (coverage)	# of Sites	% of Sites
No Plants	7	11
>0-10%	3	5
10-40%	0	0
40-60%	10	16
60-90%	12	19
>90%	32	50
Total Sites with Plants	57	89
Total # of Sites	64	100

Plant Density	Chara	Coontail	Curlyleaf Pondweed	Duckweed	Eurasian Watermilfoil	Flatstem Pondweed
Absent	57	16	58	58	50	62
Present	1	4	2	0	8	2
Common	1	6	0	4	4	0
Abundant	2	9	0	2	1	0
Dominant	3	29	4	0	1	0
% Plant Occurrence	10.9	75.0	9.4	9.4	21.9	3.1

Plant Density	Giant Duckweed	Sago Pondweed	Star Duckweed	Watermeal	White Water Lily
Absent	50	61	63	62	27
Present	4	1	0	0	0
Common	9	2	0	1	8
Abundant	1	0	1	1	9
Dominant	0	0	0	0	20
% Plant Occurrence	21.9	4.7	1.6	3.1	57.8

Lake Minear 2015 Aquatic Plants



Rake Density (coverage)	# of Sites	% of Sites
No Plants	26	31
>0-10%	19	23
10-40%	18	21
40-60%	10	12
60-90%	2	2
>90%	9	11
Total Sites with Plants	58	69
Total # of Sites	84	100

Plant Density	Chara	Coontail	Curlyleaf Pondweed	Eurasian Watermilfoil	Flatstem Pondweed	Illinois Pondweed
Absent	77	47	75	78	75	83
Present	1	15	6	3	5	0
Common	4	13	2	2	2	0
Abundant	1	8	1	1	2	1
Dominant	1	1	0	0	0	0
% Plant Occurrence	8.3	44.0	10.7	7.1	10.7	1.2

Plant Density	Largeleaf Pondweed	Sago Pondweed	Slender Naiad	Southern Naiad	Water Stargrass
Absent	77	73	83	82	82
Present	0	2	1	1	0
Common	0	3	0	1	0
Abundant	0	3	0	0	2
Dominant	7	3	0	0	0
% Plant Occurrence	8.3	13.1	1.2	2.4	2.4

Aquatic Plant Management

- Create an Aquatic Plant Management
- Survey your lake for aquatic plants
- Create carp exclosures



Aquatic Plant Management

C) Paul Skawinski, 2009



Water Star Grass



Flat Stemmed Pondweed



Vallisneria



American Pondweed

Common Name	Taxonomic Name	Growth Form	Food/Habitat Value	Tolerance of Turbidity
Bushy pondweed	<i>Najas flexilis</i>	Shrub	Med-High	Med
Canadian waterweed	<i>Elodea canadensis</i>	Shrub	Med	Med
Flat-stem pondweed	<i>Potamogeton zosteriformis</i>	Vertical	Med	Med-High
Muskgrass	<i>Chara sp.</i>	Meadow	High	Med
Water star-grass	<i>Zosterella dubia</i>	Shrub	Med-High	High
Wild celery	<i>Vallisneria americana</i>	Vertical	Med-High	Med-High



C) Paul Skawinski, 2009

Elodea

Aquatic Plant Management

Herbicide Application Summary

Lake Name: _____ Date: _____

Chemical: _____ Concentration: _____

Target Species: _____ Acres Treated: _____

Sampled By (Company & Operator) _____

Phone #: _____

Air Temp: _____ Water Temp: _____

Wind Speed / Direction: _____ / _____

Rain <48 Hours: None Light Moderate Heavy

*If you monitored pre/post treatment, please fill out the following

Pre Treatment ☐ Post Treatment ☐

Meter / Equipment: _____

Calibration Date: _____

Depth (FT)	Temp (F)	DO mg/L	Sat %
0.5			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			

Depth (FT)	Temp (F)	DO mg/L	Sat %
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			

Secchi Depth: _____

Carp Exclosure at St. Mary's Lake



Carp Exclosure at St. Mary's Lake



Carp Exclosure – St. Mary's Lake



Carp Exclosure – St. Mary's Lake



Fish Survey and Carp Removal



Fish Survey and Carp Removal



Zebra Mussels

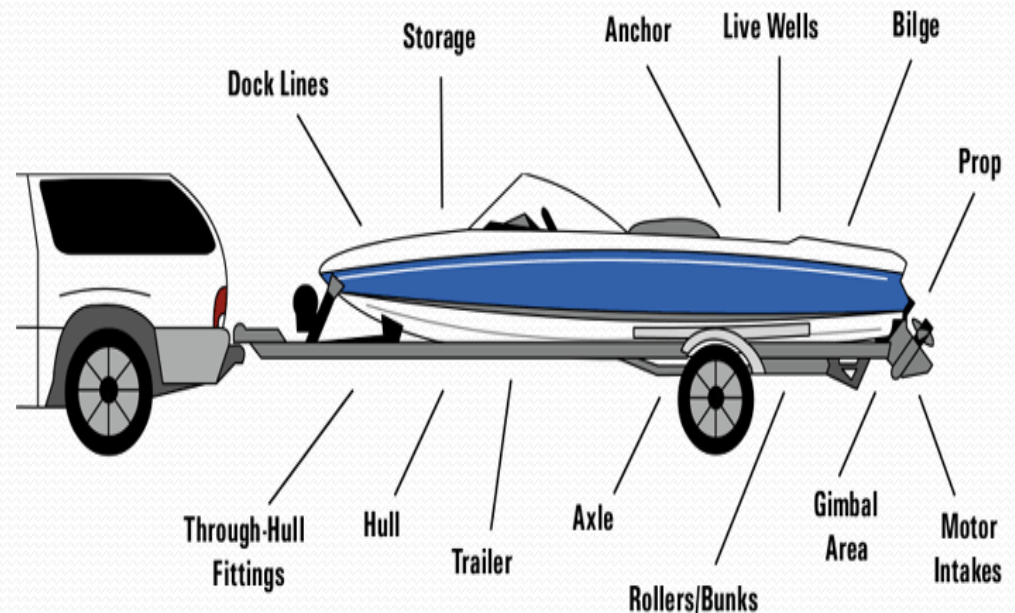
- New Infestations
- Filter feeders
- Displace native
- Can Improve
 - Water clarity
 - TP
 - TSS
- 1% Light Level
- Increase aquatic plant community especially EWM



**STOP AQUATIC
HITCHHIKERS!™**

Before launching and before leaving...

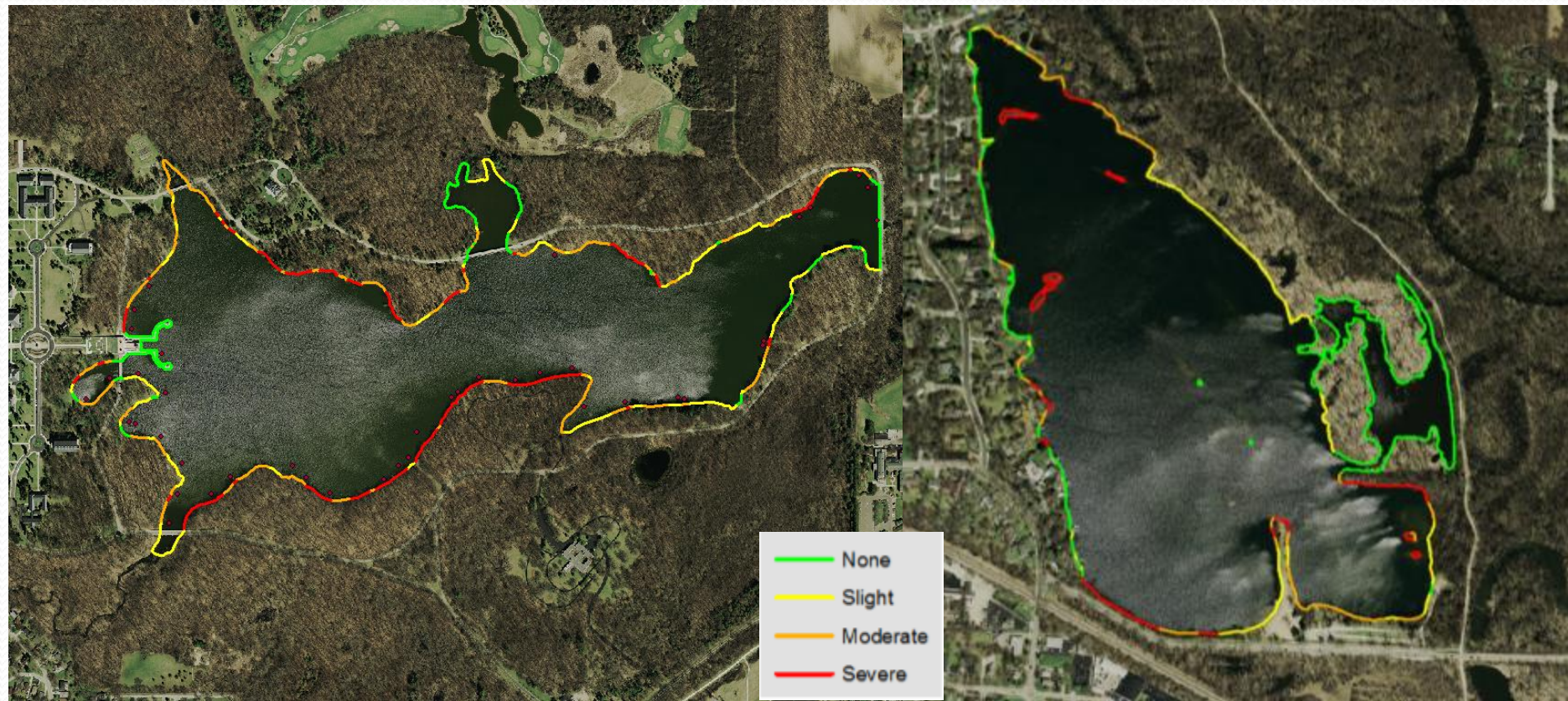
Inspect everything!



Shoreline Erosion in 2015



Shoreline Erosion 2015



Native Plants along Shorelines

- Stabilize the shoreline to prevent future erosion
- Adds habitat for wildlife
- Filter pollutants and nutrients
- Deter geese from congregating



Buffer Strips

- A continuous, vegetated strip of land comprised of the types of native plants which naturally exist in an undisturbed riparian (shoreline, stream side) setting
- A **minimum of 25'** from the waters edge.



Butler Lake Shoreline Restoration



Conductivity and Chloride

**the critical value for chlorides
in aquatic systems is 230 mg/L.**

- Conductivity is the measure of ions in the water

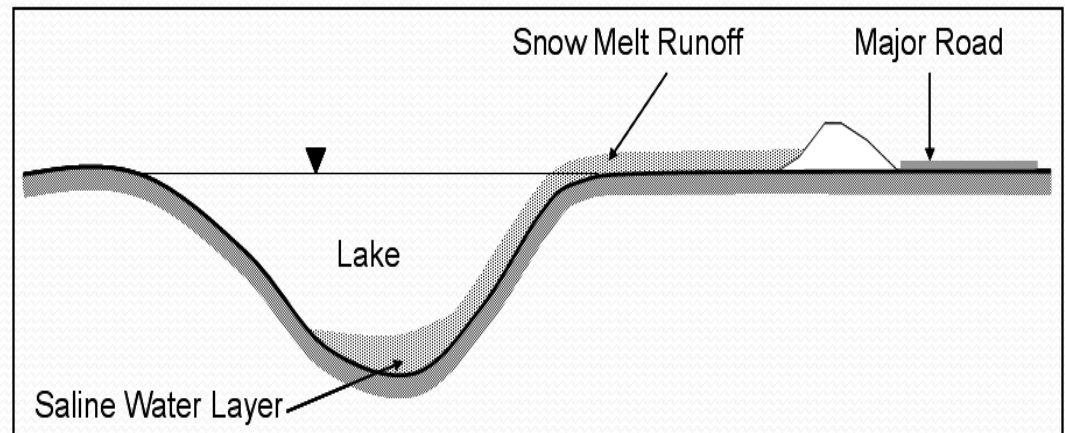
- Decrease Since 2004 (0.8232 mS/cm), and 2005 (1.328 mS/cm)
- 2015 Conductivity (0.7736 mS/cm) and below the county median (0.7920 mS/cm)

- Chlorides

- Road Salts
- Do NOT break down
- NOT used by plants or animals



**230 mg/L = 1
teaspoon
of salt added to
5 gallons of water.**



What is being done to reduce chlorides

- LC DOT Salt Alternative

- Beet juice
- Salt brine

- Advantages

- Works at lower temperatures
- Sticks to pavement
- Reduces salt use ~20%

- GPS on Snow Plows

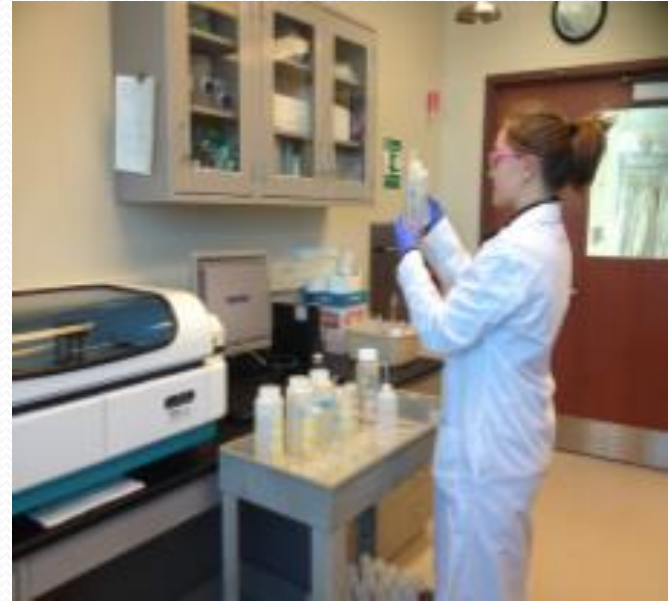
- Advantages

- Real-time tracking
- Monitor application rates
- Save on salt and gas



Beaches

- State Licensed Beaches
- Sampled for e-coli
 - Two weeks per month May through August
 - Swim ban is in effect if E. coli is **>235** E. coli/100 ml.
- Sources
 - Heavy Rainfall
 - Feces of waterfowl
 - Runoff

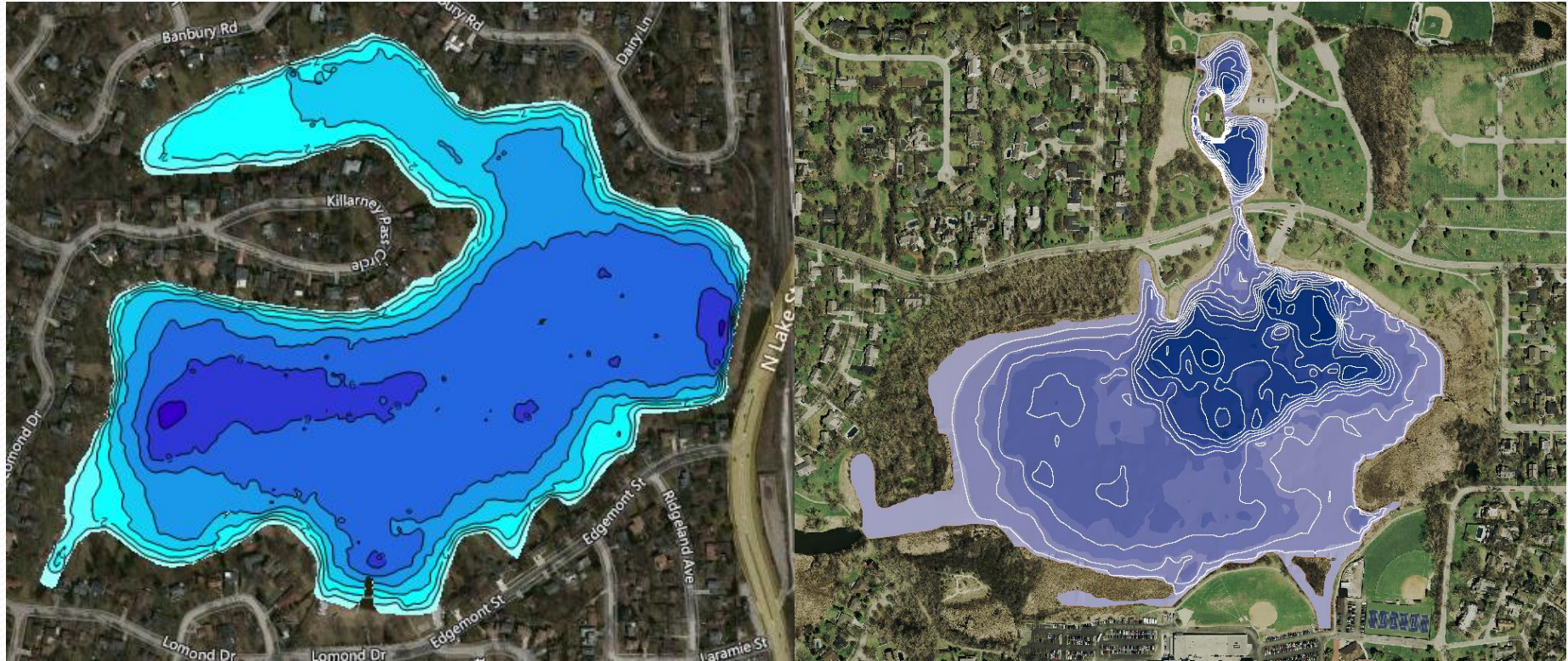


**LCHD Lab Staff Analyzes Beach Samples
for E. coli.**

Loch Lomond Beach

- June 09, 2015 sample registered 1732 FC colonies/100 ml
- August 4th, 2015 325 FC colonies/100 ml.
- Heavy rains on June 08, 2015 may have contributed to a high FC at North Beach due to its proximity to an inlet creek.

Bathymetric Map



Lake Management Plan

What are the steps in creating a Lake Management Plan?

Getting Started: Identify lake stakeholders and communication pathways

Setting Goals: Getting the effort organized, identifying problems to be addressed, and agreeing on the goals

Problem Assessment & Analysis: collecting baseline information to define the past and existing conditions. Synthesize the information, quantifying and comparing the current conditions to desired conditions, researching opportunities and constraints and setting direction to achieve goals.

Alternatives: List all possible management alternatives and evaluate their strengths, weakness, and general feasibility.

Recommendations: Prioritize management options, setting objectives and drafting the plan

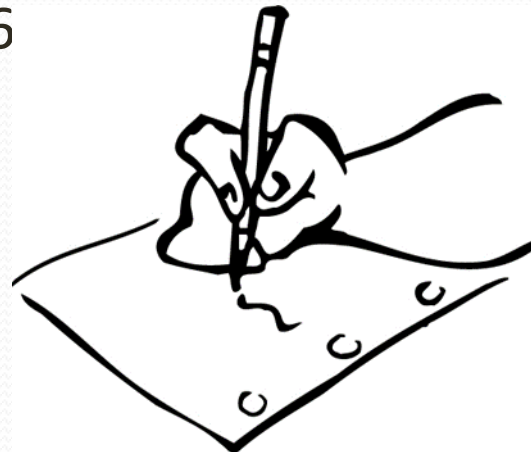
Project Management: Management of assets, detailed records of expenses and time

Implementation: adopting the plan, lining up funding, and scheduling activities for taking action to achieve goals.

Monitor & Modify: Develop a mechanism for tracking activities and adjusting the plan as it evolves.

What are the goals for the Association pertaining to Loch Lomond, St. Mary's Lake, Butler Lake and Lake Minear?

Workshop coming in Fall 2016



Summary

- Overall water quality had improved since 1999 with a decrease in total phosphorus (TP), Total Suspended Solids (TSS) and slight increase in water clarity.

	Loch Lomond Lake	Loch Lomond Lake	Loch Lomond Lake	Loch Lomond Lake	IMC Lake	IMC Lake	St. Mary's Lake	St. Mary's Lake	St. Mary's Lake	St. Mary's Lake	Butler Lake	Butler Lake	Butler Lake	Butler Lake	Lake Minear	Lake Minear	Lake Minear
Year	1999	2004	2005	2015	2003	2005	1995	2002	2005	2015	1995	2001	2005	2015	2002	2007	2015
Secchi (feet)	1.89	3.27	2.17	2.74	4.96	3.08	2.26	2.68	2.79	2.98	5.83	6.65	4.35	6.49	10.06	7.13	13.84
TSS (mg/L)	19.2	13.2	13.1	10.96	4.4	9.7	12.2	11.8	10.8	8.52	3.1	2.1	6.3	2.3	1.6	3.6	0
TP (mg/L)	0.235	0.245	0.295	0.196	0.039	0.095	0.065	0.075	0.067	0.068	0.031	0.048	0.053	0.032	0.017	0.02	0.016
Conductivity (milliSiemens/cm)	0.7076	0.8232	1.3298	0.7736	1.9958	6.1436	0.5958	1.0272	1.1774	0.998	0.5852	1.0893	1.1602	0.9946	0.657	0.6504	0.661

Recommendations

- Develop a Lake and Aquatic plant management plan
- Assess the current fish population
- Reduce carp population in the lakes
- Repair shoreline erosion
- Continue Participating in the Volunteer Lake Monitoring Program
- Incorporate native plants in the landscaping through rain gardens or shoreline filter / buffer strips
- Install a staff gauge to monitor lake level fluctuations
- Use salt alternatives and proper application procedures
- Keep accurate records of management activities and lake observations



Aquatic Plant Workshop

July 23rd, 2016

9:00 AM—12:00 PM

500 W. Winchester Rd
Libertyville, IL 60048

For more information or to RSVP:
Lake County Health Department
(847) 377-8009
abartolai2@lakecountyil.gov

Schedule:

9am-12pm: Learn to identify native and invasive aquatic plants in your lake.

Please RSVP by July 20th

Class size limited to 25 participants

QUESTIONS?

Gerard Urbanozo

gurbanozo@lakecountyil.gov

(847) 377-8030



<https://www.facebook.com/groups/LCHDEcologicalServices/>